

## CLAIMS

## What is claimed is:

1. A computer system, comprising:

an operating system adapted to execute a plurality of applications;

5 an isochronous audio application executable within the operating system substantially in parallel with other applications executable by the operating system;

a network interface configured to operate within the operating system, the network interface operable to send and receive via a switched network a stream of packets for the applications, where the stream of packets includes data packets and  
10 isochronous audio packets; and

an isochronous audio driver in communication with the network interface and the applications, the isochronous audio driver configured to decode isochronous audio packets in the received stream of packets and provide decoded audio data included in the isochronous audio packets to the isochronous audio application, the isochronous  
15 audio driver further configured to pass the data packets without change to the other applications.

2. The computer system of claim 1, where in response to only one interrupt request from the network interface, the operating system is configured to execute the network  
20 interface, the isochronous audio driver and the isochronous audio application as a group to process isochronous audio packets received from and transmitted via the switched network.

3. The computer system of claim 2, where the network interface, the isochronous  
25 audio driver and the isochronous audio application are executed sequentially without interruption when an isochronous audio packet is received from the switched network.

4. The computer system of claim 3, where the stream of data further includes synchronization packets and the network interface, the isochronous audio driver and the  
30 isochronous audio application are executed sequentially without interruption when a synchronization packet is received from the switched network to process audio data and

transmit an asynchronous audio packet that includes the audio data.

5. The computer system of claim 1, where the operating system is one of a windows operating system, a Unix operating system and a Linux operating system.

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6. The computer system of claim 1, where the isochronous audio packet is decoded to remove a header that includes an identification number, a source address and a data address.

10 7. The computer system of claim 1, where the stream of data further includes synchronization packets and the isochronous audio driver is configured to prepare isochronous audio packets for transmission in the sent stream of packets in response to receipt of one of the synchronization packets that meets a predetermined criteria.

15 8. The computer system of claim 1, where the stream of packets is a stream of Ethernet packets.

20 9. The computer system of claim 1, where the isochronous audio packets include isochronous audio data that is formatted in accordance with a CobraNet specification, and the isochronous audio packets are decoded to extract the isochronous audio data and convert the isochronous audio data to audio data.

25 10. The computer system of claim 1, where the audio data is only uncompressed audio data.

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11. A computer system, comprising:  
an operating system adapted to execute a plurality of applications;  
a network interface configured to operate within the operating system, the network interface operable to send and receive via a switched network a stream of data packets and isochronous audio packets for the applications;  
30 an isochronous audio driver in communication with the network interface and

the applications, where the isochronous audio driver is configured to identify and decode isochronous audio packets to extract audio data; and

a protocol stack adapted to communicate with the isochronous audio driver and applications other than the isochronous audio application;

5 where the isochronous audio driver is configured to provide the audio data from the decoded isochronous audio packets to the isochronous audio application, and pass the data packets received from the switched network to the protocol stack unaltered by the isochronous audio driver.

10 12. The computer system of claim 11, where the data packets passed by the isochronous audio driver to the protocol stack are in the same condition as when the data packets were received from the switched network by the isochronous audio driver.

15 13. The computer system of claim 11, where the isochronous audio driver is further configured to generate and transmit isochronous audio packets from audio data.

20 14. The computer system of claim 13, where the stream includes synchronization packets, the isochronous audio driver configured to receive and decode one of the synchronization packets and generate an isochronous audio packet from audio data in response to receipt of the one of the synchronization packets.

15. The computer system of claim 11, where the operating system is multi-tasking and multi-threaded.

25 16. The computer system of claim 15, where the operating system is configured to execute other applications substantially in parallel with the isochronous audio driver and the isochronous audio application.

30 17. The computer system of claim 11, where the operations of the isochronous audio application all occur at the driver level of the operating system.

18. The computer system of claim 11, where the protocol stack includes a TCP/IP protocol.

19. The computer system of claim 11, where the isochronous audio driver is configured to analyze and sort the isochronous audio packets and the data packets.

20. A computer system, comprising:

an isochronous audio application configured to format audio data received from a source of audio data; and

an isochronous audio driver in communication with the isochronous audio application, the isochronous audio driver configured to convert the formatted audio data to isochronous audio data and buffer the isochronous audio data;

the isochronous audio driver adapted to receive and decode a synchronization packet receivable from a switched network, where the synchronization packet includes a frame number;

where in response to receipt of the synchronization packet, the isochronous audio driver is configured to generate an isochronous audio packet that includes buffered isochronous audio data and the frame number, the isochronous audio packet transmittable over the switched network.

21. The computer system of claim 20, where the isochronous audio driver includes a packet request module configured to request audio data from the isochronous audio application whenever a packet supply buffer included in the isochronous audio driver is less than full.

22. The computer system of claim 20, where the isochronous audio driver includes a packet synchronization module configured to receive the synchronization packet and extract the frame number there from.

23. The computer system of claim 20, where the source of audio data can be any one of a compact disc, an audio data storage device and a microphone.

24. The computer system of claim 20, where the isochronous audio driver includes a packet request module, a packet supply buffer module and a packet format module, where the packet request module is configured to monitor the packet supply buffer and request additional audio data from the isochronous audio application whenever the packet supply buffer is not full, and the packet format module is configured to extract audio data from the packet supply module and format the audio data to form isochronous audio data.

25. The computer system of claim 24, further comprising a transmit buffer, where the packet format module is configured to store isochronous audio data in the transmit buffer and generate isochronous audio packets from the isochronous audio data stored in the transmit buffer for transmission over the switched network.

26. The computer system of claim 20, where the isochronous audio data includes the data indicative of the resolution of a plurality of audio data samples included in the isochronous audio data, data indicative of the frequency of the audio data samples and data indicative of the number of channels of audio data that are included in the isochronous audio data.

27. The computer system of claim 20, where the audio data in the isochronous audio packets is uncompressed.

28. The computer system of claim 20, where the isochronous audio driver is configured to operate only on a driver level of a multi-tasking, multi-threaded operating system.

29. A computer system, comprising:  
an operating system adapted to execute a plurality of applications substantially in parallel;  
isochronous audio software executable with the operating system to process

received isochronous audio packets, and generate isochronous audio packets from audio data for transmission;

5 a network interface configured to operate within the operating system, the network interface adapted to send and receive via a switched network a stream of packets for a plurality of applications, where the received stream of packets includes data packets, synchronization packets and isochronous audio packets and the sent stream of packets includes data packets and isochronous audio packets;

10 where the isochronous audio software is adapted to communicate with the network interface and the applications, the isochronous audio software configured to decode isochronous audio packets from the received stream and further configured to pass data packets from the received stream to the other applications without any processing of the data packets by the isochronous audio driver, and

15 the isochronous audio software further configured to initiate transmission of the isochronous audio packets generated by the isochronous audio software in the sent stream of packets in response to receipt of a synchronization packet in the received stream of packets.

20 30. The computer system of claim 29, where the operating system is a windows based operating system.

25 31. The computer system of claim 29, where the isochronous audio software comprises an isochronous audio driver executable at a driver level of the operating system and an isochronous audio application executable at an application level of the operating system.

30 32. The computer system of claim 29, where the isochronous audio software comprises an isochronous audio driver and an isochronous audio application, and the operating system is operable in a safe mode in which the isochronous audio driver is enabled to be executed and the isochronous audio application is disabled.

33. The computer system of claim 29, where the isochronous audio software is

configured to be executable in a pre-configured and pre-existing operating system utilizing pre-existing and pre-configured hardware.

34. A computer system, comprising:

an operating system adapted to execute a plurality of applications;

a network interface configured to operate within the operating system, the network interface operable to send and receive isochronous audio packets and data packets via a switched network; and

isochronous audio software that is executable within the operating system substantially in parallel with other applications executable by the operating system, the isochronous audio software executable to process isochronous audio packets received from or provided to the network interface, where the isochronous audio packets each include audio data.

35. The computer system of claim 34, where the network interface is configured to generate an interrupt request to the operating system, the network interface and the isochronous audio software executable to process the isochronous audio packets in response to only one interrupt provided by the operating system in response to the interrupt request.

36. The computer system of claim 34, where the isochronous audio software is executable to format audio data into the isochronous audio packets for transmission over the switched network.

37. The computer system of claim 36, where the isochronous audio packets are formatted in accordance with a CobraNet specification.

38. The computer system of claim 34, where the isochronous audio software is configured to retrieve the audio data from a memory device and generate the isochronous audio packets provided to the network interface.

39. The computer system of claim 34, where the isochronous audio software is configured to process the isochronous audio packets received from the network interface to extract the audio data, the audio data storable in a memory device by the isochronous audio software.

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40. The computer system of claim 34, where the switched network is an Ethernet network.

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41. The computer system of claim 34, where the audio data is only uncompressed audio data.

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42. A computer system, comprising:  
an operating system adapted to execute a plurality of applications;  
a network interface configured to operate within the operating system, the network interface operable to receive isochronous audio packets and data packets from a switched network; and

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isochronous audio software that is executable within the operating system substantially in parallel with other applications executable by the operating system, the isochronous audio software executable to extract audio data from the isochronous audio packets received from a switched network.

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43. The computer system of claim 42, further comprising a protocol stack executable substantially in parallel with the isochronous audio software to extract data from the data packets received from the switched network for the other applications.

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44. The computer system of claim 42, where the isochronous audio software comprises an isochronous audio driver configured to extract the audio data and an isochronous audio application configured to process the audio data to be playable and savable in a predetermined format.



45. The computer system of claim 42, where the data packets are formatted to a transmission control protocol/Internet protocol.

46. The computer system of claim 42, where the switched network is an Ethernet network and the network interface is an Ethernet network interface.

47. The computer system of claim 42, where the network interface conforms to an IEEE 802.3 standard.

48. The computer system of claim 42, where the network interface is adapted to transmit the isochronous audio packets to the switched network.

49. The computer system of claim 48, where the isochronous audio software is executable to format audio data into the isochronous audio packets.

50. The computer system of claim 42, where the isochronous audio packets are formatted in accordance with a CobraNet specification.

51. A computer system, comprising:

an operating system configured to operate a multi-threaded, multi-tasking computing environment;

a network interface configured to operate with the operating system, the network interface configured to transmit isochronous audio packets via a switched network, and configured to receive data packets and synchronization packets from a switched network; and

isochronous audio software that is executable within the operating system substantially in parallel with other applications executable within the operating system, the isochronous audio software executable to format audio data into isochronous audio packets for transmission by the network interface in response to receipt of one of the synchronization packets.

52. The computer system of claim 51, where the isochronous audio packets are formatted in accordance with a CobraNet specification.

53. The computer system of claim 51, comprising network software that is executable to extract data from the data packets received from the switched network.

54. The computer system of claim 51, where the isochronous audio software comprises an isochronous audio driver.

55. The computer system of claim 51, where the isochronous audio software comprises an isochronous audio application.

56. The computer system of claim 51, where the data packets and synchronization packets are formatted to a transmission control protocol/Internet protocol.

57. The computer system of claim 51, where the switched network is an Ethernet network and the network interface is an Ethernet network interface.

58. A computer system, comprising:

a network interface;

an operating system that is adapted to execute a plurality of applications, the applications executable within the operating system to communicate with a switched network via the network interface according to a network protocol; and

isochronous audio software that is executable within the operating system substantially in parallel with other applications executable within the operating system, the isochronous audio software executable to communicate isochronous audio packets with the switched network via the network interface.

59. The computer system of claim 58, where the protocol is a transmission control protocol/Internet protocol.

60. The computer system of claim 58, where the isochronous audio packets are formatted to a CobraNet specification.

61. A method of communicating isochronous audio packets over a switched  
5 network, comprising:

receiving a stream of packets with a network interface, where the stream of packets includes data packets and isochronous audio packets;

processing the stream of packets with a network interface driver;

10 processing the stream of packets with an isochronous audio driver to pass without change those packets that are data packets to a protocol stack;

decoding those packets that are isochronous audio data with the isochronous audio driver; and

substantially in parallel decoding those packets that are data packets with the protocol stack.

15 62. The method of claim 61, where processing the stream of packets with an isochronous audio driver includes determining whether the packet is an isochronous audio packet.

20 63. The method of claim 61, where decoding those packets that are isochronous audio data with the isochronous audio driver includes extracting audio data from the packets only if the packet is an isochronous audio packet.

25 64. The method of claim 63, where extracting audio data comprises further processing audio data that is extracted from the isochronous audio data with an isochronous audio application.

30 65. The method of claim 63, where extracting audio data comprises storing the extracted audio data on a hard drive.

66. The method of claim 61, where processing the stream of packets comprises generating an interrupt request, processing the stream of packets with the network interface driver and also processing those packets that are isochronous audio data with the isochronous audio driver when the interrupt request is granted.

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67. The method of claim 61, where decoding those packets that are isochronous audio data comprises converting the audio data to audio data in a desired format.